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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense									DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 0400: Research, Development, Test & Evaluation, Defense-Wide BA 3: Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603618D8Z: Joint Electronic Advanced Technology							
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	8.757	10.751	8.386	0.000	8.386	8.479	8.587	9.244	9.917	Continuing	Continuing
P619: Joint Electronic Advanced Technology	8.757	10.751	8.386	0.000	8.386	8.479	8.587	9.244	9.917	Continuing	Continuing
A. Mission Description and Budget Item Justification											
<p>(U) In Overseas Contingency Operations, the United States (U.S.) must be ready to meet the widespread and growing threat of Man Portable Air Defense Systems (ManPADS) and other portable small weapons improvised from commercially available electronic sensors, computer modules, navigation and control components coupled with widely proliferated explosives, mortars, rockets and small manned or unmanned aircraft. Such devices provide terrorists and foreign military units the novel means to rapidly construct a wide range of weapons capable of disruptive actions against civilian and military forces alike. The U.S. must be ready to counter such weapons on short notice.</p>											
<p>(U) The asymmetric nature of such devices is already well understood by terrorists. Improvised explosive devices are in widespread use. ManPADS and mortars have been used to attack both air and ground forces, and pose a threat to any region due to their portability. Unmanned Aerial Vehicles (UAVs) capable of short range operations involving chemical, biological or explosive payloads can be found routinely available through commercial purchase and are easily adaptable to conduct precision attacks for terror purposes using commercial radio control systems. Civil navigation and autopilot devices capable of precisely controlling UAVs can be held in the palm of the hand. Digital processors, analog-to-digital converters and digital optical sensors give terrorists the means to deploy unexpected threats on short notice. Conventional kinetic defenses against these devices can be impractical in urban settings. Because the speed of appearance of these disruptive devices can be short, such threats are asymmetric in comparison with the typical long development cycles associated with U.S. military defensive systems. Together these asymmetries highlight the need to rapidly evolve alternative Electronic Warfare, Information Operations and Counter Terrorism capabilities suitable for neutralizing such threats. This program element investigates novel means to detect and neutralize these asymmetric threats, as well as special mission and other methods to employ asymmetric principles against our adversaries.</p>											

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APPROPRIATION/BUDGET ACTIVITY		R-1 ITEM NOMENCLATURE			
0400: Research, Development, Test & Evaluation, Defense-Wide		PE 0603618D8Z: Joint Electronic Advanced Technology			
BA 3: Advanced Technology Development (ATD)					
B. Program Change Summary (\$ in Millions)					
	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	9.320	10.838	0.000	0.000	0.000
Current President's Budget	8.757	10.751	8.386	0.000	8.386
Total Adjustments	-0.563	-0.087	8.386	0.000	8.386
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.443	0.000			
• SBIR/STTR Transfer	-0.120	0.000			
• Other Adjustments	0.000	-0.087	8.386	0.000	8.386
Change Summary Explanation					
FY 2010 Program/budget decisions					

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P619: <i>Joint Electronic Advanced Technology</i>	8.757	10.751	8.386	0.000	8.386	8.479	8.587	9.244	9.917	Continuing	Continuing

A. Mission Description and Budget Item Justification

(U) The widespread and growing availability of sophisticated, commercially available electronic sensors, computer modules, navigation and control components coupled with widely proliferated Man Portable Air Defense Systems (ManPADS), portable explosives, mortars, rockets and small aircraft provide terrorists and foreign military units with the novel means to rapidly construct a wide range of weapons capable of disruptive actions against military forces. In Overseas Contingency Operations, the United States (U.S.) must be ready to counter such weapons on short notice. The asymmetric nature of such devices is already well understood by terrorists. Improvised explosive devices are in widespread use. ManPADS, man portable weapons and mortars have been used to attack both air and ground forces, and pose a threat to any region due to their portability. Unmanned Aerial Vehicles (UAVs) capable of short range operations involving chemical, biological or explosive payloads can be found routinely available through commercial purchase and are easily adaptable to conduct precision attacks for terror purposes using commercial radio control systems. Civil navigation and autopilot devices capable of precisely controlling UAVs can be held in the palm of the hand. Digital processors, analog-to-digital converters and digital optical sensors give terrorists the means to deploy unexpected threats on short notice. Because conventional kinetic defenses against these devices can be impractical in urban settings and because the speed of appearance of such devices can be short, such threats are disruptive and asymmetric in comparison with the typical long development cycles associated with U.S. military defensive systems. These asymmetries highlight the need to rapidly evolve alternative Electronic Warfare, Information Operations and Counter Terrorism capabilities suitable for neutralizing such threats. This program element will investigate novel means to detect and neutralize these asymmetric threats, as well as special mission and other methods to employ asymmetric principles against our adversaries.

(U) This program element seeks to identify rapidly deployable solutions (outside of service programs of record) that can effectively mitigate asymmetric threats by integrating advanced commercial or military off-the-shelf technology in innovative ways that augment and/or reduce risk when inserted into service programs of record. Laboratory and field testing will be used to evaluate the feasibility and military utility of resultant low cost, near term capabilities. FY 2011 efforts will investigate, integrate, test and demonstrate elements of the following technologies:

1. Ground based counter ManPADS concepts and systems that provide area protection in the vicinity of military airports, expeditionary airfields, forward operating bases, forward area refueling points or other high value locations. A real time distributed ground based missile warning system will be evaluated at a major urban airport to collect clutter data and verify performance enhancements developed in FY 2009 and FY 2010. This missile warning system is being initially integrated via data link to countermeasure equipped helicopters, with further application to fixed wing countermeasures equipped aircraft. Potentially viable ground based countermeasures concepts will be evaluated and tested to assess developmental risk. Subsequent efforts will assess integration of ground based missile warning/tracking systems with future ManPADS countermeasures systems.

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<p>2. Low cost, near term technologies to allow Department of Defense aircraft to fly in medium to high Man Portable Air Defense Systems (ManPADS) threat airspace in support of Overseas Contingency Operations (OCO). Emphasis is on threats, aircraft and system approaches not covered by existing programs of record; including innovative active missile warning, advanced kinetic decoys, miniature high reliability lasers, ultra-short pulsed lasers, magnetically steered high reliability pointer-trackers, higher powered and higher duty cycle lasers, data linked mutual warning and countermeasures, and preemptive countermeasures systems. Initial tasks leading to a rapid technology transition will be completed.</p> <p>3. Emerging commercially derived technologies; including rapid prototyping of those required to combat adaptive threats in the OCO including, small unmanned aerial vehicle detection and engagement by kinetic and non-kinetic means. Emphasis will be on demonstrating an end-to-end kill chain and techniques which minimize or eliminate collateral damage. New efforts starting in FY 2010 and FY 2011 will include novel techniques to detect and locate the signatures of terrorist activities using electronic means, as well as conducting counter-terrorism experiments to evaluate the maturity of and transition special mission projects to theater.</p>						
B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Ground Based Counter-Man Portable Air Defense Systems		2.300	2.685	0.446	0.000	0.446
Ground based counter ManPADS concepts and systems that provide area protection in the vicinity of military airports, expeditionary airfields, or other high value locations. A second complete distributed ground based missile warning system will be built and evaluated at a major urban airport to collect clutter data and verify performance enhancements developed in FY 2009. This missile warning system is being initially integrated with aircraft based countermeasures systems. Potentially viable ground based countermeasures concepts will be evaluated and tested to assess developmental risk. Subsequent efforts will assess integration of ground based missile warning/tracking systems with future ManPADS countermeasures systems.						
FY 2009 Accomplishments: Under a Cooperative Research and Development Agreement with Army Research Laboratory and Northrop-Grumman, performed initial testing of a novel ground based countermeasures and static testing at White Sands Missile Range. Developed proposals and submitted to the Department of Homeland Security for testing the Raytheon Vigilant Eagle high powered microwave airspace						

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
<p>protection system in a live fire environment. Evaluated Infrared (IR) sensors for missile detection performance and suitability; modeled and evaluated ground-engagement concepts; developed and refined integration and tracking software; evaluated detection and tracking performance in live fire events; completed Event Origin Estimator that pinpoints shooter location after missile alert is issued; implemented remote power and control systems in software to allow for full operational control of each remote optical node, allowing for unattended system deployment. The results should yield a proven, three-element IR sensor array whose demonstrated performance in a four-pole configuration is capable of exceeding required detection and tracking parameters under constrained launch conditions for all threats tested. Provided thermal signature data on a representative set of fixed-wing commercial aircraft to the United States Air Force tanker program.</p> <p><i>FY 2010 Plans:</i> This project integrates netted, ground-based, infrared sensor technologies including the Distributed Ground Based Threat Detection System (DGTDS). By combining high-speed, high-resolution tracking mechanisms with either on-board decoys or on-/off-board directed-energy devices, it seeks to demonstrate the end-to-end capability to detect, track, and defeat shoulder-fired Man Portable Air Defense Systems (ManPADS) known to be in the hands of terrorists in Iraq and elsewhere. Subsequent efforts will complete the assessment of this system and will document performance characteristics for consideration by force protection planners, integrated military base defense experts, and homeland defense officials. FY 2010 will develop a portable missile verification system which will integrate a gimbaled track mount to optically identify threat missiles; test and measure this system for its ability to detect, warn and track other threats such as aircraft, cruise missiles, and unmanned aerial vehicles whose signatures represent a difficult challenge for many conventional weapons systems. FY 2010 will address transportability of commercial off-the-shelf sensor hardware with custom processors and software. Follow-on testing will continue under the Cooperative Research and Development Agreement (CRADA) with Army Research Laboratory and Northrop-Grumman.</p>						

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		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: FY 2011 efforts will address mobility and militarization, as well as testing of other ground based countermeasures concepts. FY 2011 will initiate long-term comparison testing of DGTDS tracking vs. Kinetic Tracking Mount tracking, and initiate several new algorithms, including early process false alarm elimination and attempts to identify missile type. Follow-on testing will continue under the CRADA with Army Research Laboratory and Northrop-Grumman.						
Low Cost/Near Term Counter-Man Portable Air Defense Systems Low cost, near term technologies to allow Department of Defense aircraft to fly in medium to high ManPADS threat airspace in support of Overseas Contingency Operations. Emphasis is on threats, aircraft and system approaches not covered by existing programs of record; including innovative active missile warning, advanced kinetic decoys, miniature high reliability lasers, ultra-short pulsed lasers, magnetically steered high reliability pointer-trackers, higher powered and higher duty cycle lasers, data linked mutual warning and countermeasures, and preemptive countermeasures systems. Initial tasks leading to a rapid technology transition will be completed. FY 2009 Accomplishments: Completed phase II and IIIa of a three phase project to combine ground based passive missile warning with a data link to a UH-1Y/AH-1Z equipped with flares. Completed data link study and selected minimum cost, weight, and power data link; briefed Naval Air Systems Command on plans for phase III. Completed the analysis of previous laboratory, anechoic chamber characterization, and live fire testing of selected components; initially evaluated pyrophoric material effectiveness in a responsive scenario. Published final report on active Man Portable Air Defense Systems (ManPADS) testing. FY 2010 Plans: This project completes ongoing efforts to determine the feasibility of substantially improving the protection of air platforms by combining ground based detection with airborne pyrophoric countermeasures. FY 2010 will advance this hybrid countermeasure project to demonstrate a tactical		4.046	5.197	3.348	0.000	3.348

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<p>data link useable on UH-1/AH-1 platforms of ManPADS detection, tracking, warning and engagement under all-aspect launch conditions and will complete the integration required for a separately funded initial flight demonstration of the integrated system and countermeasures called Aircraft ManPADS Protection System. It may produce a proof of concept event which positively confirms the ability of the system to defeat a ManPADS under live-fire conditions by automatically remotely triggering flares on drone aircraft.</p> <p>Air platform protection can reduce false alarm events by combining existing active and passive sensors with advanced sensor fusion software. Current operations have shown that missile detection and warning systems now used by United States and coalition forces are adversely affected by the large number of background events. The technologies under examination use multiple spectrally independent sensors and fusion algorithms, since at least one sensor would always be free of interference, it is estimated that the fusion could reduce false alarms to near-zero levels while retaining exceptionally high threat detection rates. Joint and Allied Threat Awareness System will transition multi-spectral missile warning as part of its System Development Demonstration program. FY 2010 will use measured data to update simulated performance objectives prior to attempting an on-aircraft integration and evaluation; will conclude testing to verify and validate performance and will document results for inclusion in future aircraft force protection programs.</p> <p><i>FY 2011 Base Plans:</i> This project completes ongoing efforts to determine the feasibility of substantially improving the protection of air platforms by combining ground based detection with airborne pyrophoric countermeasures. FY 2011 will advance this hybrid countermeasure project to demonstrate a tactical data link useable on UH-1/AH-1 platforms of Man Portable Air Defense Systems (ManPADS) detection, tracking, warning and engagement under all-aspect launch conditions and will complete the integration required for a separately funded initial flight demonstration of the integrated system and countermeasures called Aircraft ManPADS Protection System.</p>						

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B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Air platform protection can reduce false alarm events by combining existing active and passive sensors with advanced sensor fusion software. Current operations have shown that missile detection and warning systems now used by United States and coalition forces are adversely affected by the large number of background events. The technologies under examination use multiple spectrally independent sensors and fusion algorithms, since at least one sensor would always be free of interference, it is estimated that the fusion could reduce false alarms to near-zero levels while retaining exceptionally high threat detection rates. Joint and Allied Threat Awareness System will transition multi-spectral missile warning as part of its System Development Demonstration program. FY 2011 will use measured data to update simulated performance objectives prior to attempting an on-aircraft integration and evaluation; will conclude testing to verify and validate performance and will document results for inclusion in future aircraft force protection programs. Further work will include evaluating higher powered and higher duty cycle lasers, hostile fire evaluation, and innovative use of Mini Scanning Mirror for visually degraded environments. The management and sustainment of the Infrared (IR) signatures database and development of an IR countermeasures database will be funded from this project in FY 2011. The project will complete planning for a database project based upon current Electronic Warfare database capability to create an IR countermeasure effectiveness database.					
Disruptive Technology Defeat and Utilization Emerging commercially derived technologies; including rapid prototyping of those required to combat adaptive threats in the Overseas Contingency Operations including, small unmanned aerial vehicle detection and engagement by kinetic and non-kinetic means. Emphasis will be on demonstrating an end-to-end kill chain and techniques which minimize or eliminate collateral damage. New efforts starting in FY 2010 and FY 2011 will include novel techniques to detect and locate the signatures of terrorist activities using electronic means.	2.411	2.869	4.592	0.000	4.592

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B. Accomplishments/Planned Program (\$ in Millions)								
				FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
<p><i>FY 2009 Accomplishments:</i></p> <p>This project hosted a Counter Unmanned Aerial Vehicle (UAV) event, nicknamed Black Dart, currently the largest known database for sensor-weapons detection and response capabilities. Documented various UAV signatures, sensors and defeat mechanisms to assess the current range at which such UAVs can be reasonably detected and determined state of the art, unconventional, near-term defeat options, including directed energy options. Addressed risks identified by Defense Science Board, United States Air Force Science Advisory Board, Chief of Naval Operations Deep Blue, and Department of Homeland Security. Further efforts completed numerous studies for Office of the Secretary of Defense-Acquisition, Technology and Logistics (AT&L) and provided subject matter technical expertise to the AT&L Aviation Support Equipment Joint Analysis Team resulting in an Acquisition Decision Memorandum by the Under Secretary of Defense.</p>								
<p><i>FY 2010 Plans:</i></p> <p>This project will provide expertise to Joint Integrated Air and Missile Defense Organization, jointly with United States Northern Command (USNORTHCOM), for a variety of United States defense systems to be demonstrated and evaluated in the May 2010 timeframe and to demonstrate an end-to-end kill chain. FY 2010 efforts will be developed in coordination with the defense research community and Defense Intelligence Agency (DIA) elements seeking ways to avoid technological surprise. Further efforts will investigate novel means of detecting and locating signatures of terrorist activity, differentiating between terrorist and indigenous activities and providing timely, actionable intelligence that allows asymmetric disruption of terrorist kill chains. The project will perform studies for Office of the Secretary of Defense-Director Defense Research and Engineering (DDR&E) and provide subject matter technical expertise to the DDR&E DST team as directed by the Under Secretary of Defense.</p>								
<p><i>FY 2011 Base Plans:</i></p> <p>This project will continue to provide expertise to Joint Integrated Air and Missile Defense Organization, jointly with USNORTHCOM, for a variety of United States defense systems to be demonstrated and evaluated in the May 2011 timeframe and to demonstrate an end-to-end kill chain. FY 2011 efforts will</p>								

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B. Accomplishments/Planned Program (\$ in Millions)					
				FY 2009	FY 2010
				FY 2011 Base	FY 2011 OCO
				FY 2011 Total	
<p>be developed in coordination with the defense research community and DIA elements seeking ways to avoid technological surprise. Further efforts will investigate novel means of detecting and locating signatures of terrorist activity, differentiating between terrorist and indigenous activities and providing timely, actionable intelligence that allows asymmetric disruption of terrorist kill chains. Offensive operations involving information operations disruptive technology will be evaluated in a scenario based exercise which will lead to immediate deployment of special mission capability. The project will perform studies for Office of the Secretary of Defense-Director Defense Research and Engineering (DDR&E) and provide subject matter technical expertise to the DDR&E DST team as directed by the Under Secretary of Defense.</p>					
Accomplishments/Planned Programs Subtotals				8.757	10.751
				8.386	0.000
				8.386	
C. Other Program Funding Summary (\$ in Millions)					
N/A					
D. Acquisition Strategy					
Not applicable.					
E. Performance Metrics					
Not applicable.					

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